SOCI 314: Science at Risk?
Out of the Lab and Into the Public Sphere
Spring, 2015
REVISED SYLLABUS

Course Meetings: Wednesday, 2-5P, Sewall 305

Course Instructor: Elaine Howard Ecklund, Autrey Professor of Sociology

Office hours: By appointment in 372 Sewall Hall or 5-530P on Wednesdays after class

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Course Overview

Many of us have a love/hate relationship with science. We partake of science on a daily basis, through commonplace items like refrigeration and iPods and commonplace tasks like going to the doctor and driving across a bridge. Yet scientists struggle for acceptance by the general public. They face charges that science is not relevant enough to daily concerns and that some scientific advances raise troubling ethical issues. There is controversy over whether there should be more or less public funding for science and how much science should have authority over other ways of knowing, such as religion, or even if there are "other ways of knowing." The scientific enterprise and scientists themselves are under pressure, by charges that the scientific workforce (and university science, in particular) does not represent the general public in terms of gender or racial make-up. Scientists are under pressure to please corporate and political interests. And general science knowledge among the US public is lower than in most industrialized nations. In this course we will explore all of these issues and more as we ask what happens when science enters the public sphere and the public sphere enters science.

This course must be inherently inter-disciplinary. Politicians, ethicists, theologians, and public policy experts all discuss issues related to science and society. And we will read some of these works, including history, religious studies, and natural science texts. The driving force behind the course, however, will be to explore the controversial issues facing science today through the lens of sociology (and the social sciences more broadly) meaning that we will talk a lot about what unique forms of knowledge sociology can

bring to the study of how scientists interact with the public and how the public influences science.

Course Objectives
Throughout the course students will:

- Gain a better understanding of key issues facing the acceptance of science in the general public.
- Gain a better understanding of issues challenging the creation of science.
- Learn how to evaluate public science through the lens of sociology (its methods, concepts, and theories).
- Develop better critical thinking and writing skills.

Required Texts
Ecklund, Elaine Howard. 2012. *Science Vs. Religion: What Scientists Really Think.* New York: Oxford University Press.

Goodstein, David. 2010. *On Fact and Fraud: Cautionary Tales from the Front Lines of Science*. Princeton: Princeton University Press.

Mooney, Chris and Sheril Kirshenbaum. 2010. *Unscientific America: How Scientific Illiteracy Threatens our Future*. New York: Basic Books.

Skloot, Rebecca. 2011. *The Immortal Life of Henrietta Lacks*. New York: Crown Publishing Group.

Snow, C.P. 2012. *The Two Cultures*. New York: Cambridge University Press.

Additional Course Readings Can Be Found at OWL-SPACE for this course.

In addition, there are two optional books available in the book store, which have had a recent important impact on public discussions of science and which I urge you to purchase:

Collins, Francis. 2007. *The Language of God: A Scientist Presents Evidence for Belief*. New York: The Free Press (optional).

Dawkins, Richard. 2008. *The God Delusion*. Boston and New York: Houghton Mifflin Company (optional).

Assignments
Final Grades will be based on three key aspects of the course:

Exam 1 (30 percent):

The first exam will be an in-class essay exam that covers all of the material for the first half of the course. Students will have about an hour and a half to complete the exam, which will be closed-book and closed-note and consist of a combination of terms, short answer, and essay questions that incorporate both readings and in-class course material.

Exam 2 (30 percent):
The second exam will be a closed book in-class essay exam that will cover all of the material for the second half of the course. Students will have about an hour and a half to complete the exam, which will be closed-book and closed-note, and consist of a combination of terms, short answer, and essay questions that incorporate both readings and in-class course material.

Thought Papers (30 percent):
Students will also write four thought papers. These will be at least two and no more than four pages (double-spaced, one-inch margins, 12 pt. font) and deal with some of the key questions related to the day's readings. The major aim of these papers is to synthesize the readings and relate them to one another and to the major themes of the course rather than merely to summarize the readings (learning how to do this takes practice and I may ask you to re-write one or more of your initial thought papers). **These should be given to Dr. Ecklund by 9A the day of class (so that I have time to read them before class) (email or hard copy is fine)**. Do not assume that I have received your paper if you do not receive an email from me confirming receipt. These thought papers must deal with a given week's readings from the course. See the thought papers as finished pieces of writing. If a reading is cited, an acceptable citation format should be used, for example (bibliographies are not part of total page requirement). More information about the format of thought papers will be distributed in class.

In Class Participation (10 percent):
All of the assigned reading for a given week should be finished before the class period. Students should be ready to talk about the central questions for a given week and other material raised during a course meeting.

OPTIONAL Science and Technology Policy Program Lectures

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Friday, February 6 – 12:30pm, Doré Commons, Baker Institute

"Influenza, SARS, Ebola and the Next Pandemic: Perceptions in the Media and Public"
Civic Scientist Lecture Series with Peter J. Hotez and Robert Bazell
RSVP at http://bakerinstitute.org/events/register/1687/?submit=RSVP

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Thursday, March 19 – 6:30pm, Doré Commons, Baker Institute

"When Celebrity Culture and Science Clash: The Twisting of Research and Health Policy"
Featured Speaker Timothy Caulfield
RSVP at http://bakerinstitute.org/events/register/1691/?submit=RSVP

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Thursday, April 30 – Time and location TBD

Steve Chu and Norm Augustine will be speaking about the unknown future of science R&D in the US. More information forthcoming on Baker Institute website.

Possible extra credit
Write a one page overview of the two optional books assigned and come to Dr. Ecklund's house for a discussion of the books.

Key Dates To Remember
February 25: Exam #1 – In Class Exam
March 4: No Class, Spring Break
April 8: Gathering at Dr. Ecklund's home
April 22: Exam #2 – In Class Exam

Attendance and Late Policy
Missing class and coming to class late will influence your class participation grade. Students may miss one class without penalty. All subsequent classes missed will result in a decrease of five percentage points removed from the overall class participation grade (with the exception of providing an approved university excuse). Assigned work that is turned in late on the due date will be penalized 5 percentage points. Work that is turned in after the due date will be penalized 5 percentage points per calendar day. *All work submitted via email is NOT considered turned in until you get an email from me confirming that I have received it.*

Statement on Disability
Any student with a documented disability seeking academic adjustments or accommodations is requested to speak with me during the first two weeks of class. All such discussions will remain as confidential as possible. Students with disabilities will need to also contact Disability Support Services in the Allen Center.

Summary of Grades
Exam I: 30 Percent
Exam II: 30 Percent
Thought Papers: 30 Percent
Class Participation: 10 Percent

Even if you are taking this course pass/fail, all assignments must be handed in to receive a grade of "pass."

Grading Scale
A+ Above 99 percent and evaluation of instructor
A 94-100
A- 90-93
B+ 87-89
B 84-86
B- 80-83
C+77-79
C 74-76
C- 70-73
D+ 67-69
D 64-66
D- 60-63
F 59 and below

Grading Criteria
A Range: Demonstrates exceptional ability to creatively and appropriately organize and express ideas. Moves beyond summaries to actual synthesis and critique. Student hands in all work on time and goes above and beyond in written work and course participation.

B Range: Solid work. Demonstrates good organization and expression of ides. Student hands in all work on time and participates in course discussions.

C Range: Fair work. Demonstrates moderate grasp of course material and completes assignments in an acceptable manner.

D-F Range: Unacceptable work**.** Demonstrates little grasp of the course material. Does not complete assignments in a timely manner. Missing assignments.

If you feel you have not received all the credit you deserve on any given assignment, you may inform the instructor **IN WRITING**. You must provide a written rationalization/justification of your answer and clearly explain why you think you deserve more points. This is an upper level course and thus not an "easy A" kind of course. However, that said, I do want everyone to do well and the course is *not* graded on a curve.

Honor Code
Students are expected to abide by the Rice Honor System (**http://honor.rice.edu/honor-system-handbook/**). The sociology department has created a standard set of rules that will apply to academic writing in sociology classes at Rice (handed out separately).

Classroom Expectations

In this class, we will be dealing with some personal and controversial issues that might make some students uncomfortable. While I understand that at times you may feel discomfort, it is expected that you will be able to watch in-class movies, read assigned texts, and discuss them in an academic manner. Beyond this, my expectations include the following:

1) I expect that you will give me and your colleagues your complete attention when you are in the course. This means that you will **not** sleep, read the newspaper, fiddle with or talk on your cell phone or any other electronic device, check e-mail, text, surf the web, or eat during class (we will have a 15 minute snack/break during each class and drinking during class is permitted). **Immediately upon entering the classroom, turn off your phone** if you have one. Put away your headphones and your readings for other classes. Don't pass notes or talk to other students. **We will decide what our class computer policy will be for the entirety of the semester: computers are allowed in the classroom; computer users should sit in the back two rows, so as not to distract others. There will be times during the class when students will be requested to shut their lap tops.**
2) When another student is speaking, please give that student your undivided attention.
3) It is extremely disruptive when students come to class late, leave early, or start packing up belongings before I am finished. Please do not do this.
4) Come to class prepared and ready to learn. Complete the reading assignments before coming to class. Ask questions in class/answer questions and be sure to participate in discussions.
5) Be respectful of me and of your classmates. Don't interrupt or talk while someone else is talking. Be as polite as possible.
6) I want to know how things are going for you in the course. If something is not working, tell me! I value your feedback, and want to make this an enjoyable and challenging learning experience for you.

I deeply enjoy my work and can think of little that I would rather be doing than working as your professor. You can expect the following of me:

1) I will be organized and prepared for every class meeting.
2) I will be attentive to your concerns and try my hardest to make the course material interesting, fun, accessible, and relevant.
3) I will grade fairly and promptly. Your grade will be based on your performance and not any personal consideration (such as race, gender, class, religion, or whether or not you and I agree or disagree about a particular issue). I will do my best to return assignments the next class meeting after they are turned in.
4) When you are speaking during class or when we meet during my office hours, I will do my very best to give you my undivided attention.
5) I will stick to the syllabus as closely as possible.
6) As a matter of keeping the classroom a conducive learning environment for each of you and respecting the kind of resources (money, time, otherwise) that you are

giving to be here, I absolutely will not tolerate inattention or lack of respect or civility directed towards me or towards other students.

7) I know you have other commitments besides this course and consequently I will begin and end class on time.

Note: I may change the syllabus AND ASSIGNMENTS as necessary (I will not increase the level of work). You are responsible for all changes and information presented in the course, regardless of whether you attended class.

Course Meetings

MODULE I: ORIENTING CONCEPTS

Science in the World and the World of Science: Orienting Concepts

Week 1, January 14: Science at Risk?

Why is science important? How have social scientists understood science? What can sociology bring to the study of science in the world and the world in science? Is science at risk in American society? How does science differ from the humanities? What is the current state of science education? What is the current funding structure for science? Does the Obama administration bring hope of more support for science? What could sociologists (and the social sciences more broadly) bring to the study of science in society? (In particular, what kinds of methods and theories do social scientists bring?)

Discussion of thought papers, course expectations, and class contract about laptop use.

Week 2, January 21: How Sociologists Study Science: Social Constructionist Approaches to Studying Science and Society; How Does Science Differ From the Humanities and Social Sciences?

What do sociologists of science mean when they say that science is "socially constructed?" What is the "demarcation problem?" How does Gieryn think that science is demarcated from non-science? What does Gieryn mean by the cartographic approach to understanding science? Consider your own experiences with the world of science. To what extent do you think that science is socially constructed? How have scientists responded to charges that science is socially constructed? Provide evidence for your argument. We will examine various definitions of science and ask who are the important actors in constructing science. What does CP Snow see as the main differences between the cultures of the "literary" or humanities and the sciences? How might the social sciences fit?

Reading Due: (*66 pages*)

Each student should read syllabus carefully as part of preparation for the course today.

Gieryn, Thomas F. 1983. "Boundary-Work and the Demarcation of Science from Non-Science: Strains and Interests in Professional Ideologies of Scientists." *American Sociological Review* 48:781-795.

Snow, C.P. *The Two Cultures,* p. 1-52. (Chapter 1, "The Two Cultures"; Chapter 2, "Intellectuals as Natural Luddites"; Chapter 3, "The Scientific Revolution"; Chapter 4, "The Rich and the Poor")

Thought Papers: Kate Baumann, Mark Chew, McKenna Mitchell

Week 3, January 28: The Approaches of Institutions and Scientism
What is "scientism?" How has seeing science as the supreme form of knowledge influenced other spheres of society? (Examples might be religious institutions, universities, or education.) What do you think of such arguments? What is a social/institutional approach to examining science in society? How would this approach be applied beyond the study of religion and science? Evaluate the conflict approach to science and religion? What is the "scientistic fallacy?"

Evaluation of the class thus far.

Reading Due: (*29 pages*)
Evans, John H. and Michael S. Evans. 2008. "Religion and Science: Beyond the Epistemological Conflict Narrative." *Annual Review of Sociology* 34:87-105.
(Guided reading questions forthcoming.)

Peterson, Gregory R. 2003. "Demarcation and the Scientistic Fallacy." *Zygon: Journal of Religion and Science* 38:751-761.

Thought Papers: Morgan Abernathy, Kate Baumann, Mark Chew, Jacob Hernandez, Marie Hoeger, Kelly King, Rebecca Maher, McKenna Mitchell, Meron Teklu, Helen Wei

MODULE II: SCIENTISTS AND SCIENCE ENTER THE BROADER PUBLIC

Week 4, February 4: Challenges to Science Education and the Public Acceptance of Science and the Media
We will watch a brief video on Carl Sagan to introduce this discussion.
How does the US score on science competency when compared to other developing nations? What are some of the challenges to better science education in the US? How have scientists suggested rectifying such challenges? What are the unique challenges faced by the US when compared to other nations? What could sociology (in particular some of the core concepts we have been discussing during the past three weeks) bring to understanding the challenges facing US science education? Evaluate the attempts of media efforts to increase understanding of science/raise interest in science among members of the general public and school children in particular. And we will discuss how public and private secondary schools differ in science education. Related to public science education, we will also discuss some of scientists' attempts to convince the American public of environmental decline.

Reading Due: (*85 pages*)
Mooney. *Unscientific America*, p. 1-50; 81-108. (Chapter 1, "Why Pluto Matters"; Chapter 2, "Rethinking the Problem of Scientific Illiteracy"; Chapter 3, "From Sputnik to Sagan"; Chapter 4, "Third Culture, or Nerd Culture?"; Chapter 7, "Hollywood and the Mad Scientists"; Chapter 8, "Bruising Their Religion")

National Science Board. "America's Pressing Challenge - Building a Stronger Foundation. A Companion to Science and Engineering Indicators – 2006." National Science Foundation. http://www.nsf.gov/statistics/nsb0602/nsb0602.pdf

VanRiper, A. Bowdoin. 2003. "What the Public Thinks it Knows About Science," *Embo Reports.* p. 1-4.

Thought Papers: Morgan Abernathy, Brian Barr, Kate Baumann, Mark Chew, Sarah Paschal Gerenday, Jacob Hernandez, Marie Hoeger, Elizabeth Liu, Danni Vasquez-Corpus, Helen Wei

Week 5, February 11: Ethical Challenges to Science
(Focus: Human Reproductive Genetics, Stem Cell Research, Animal Use in Research, GMOs, Other Ethical Challenges to Science)
What are some of the most pressing ethical issues that challenge the acceptance of science by the general public? How do those in the general public understand the connections between ethics and science? What kinds of resources do members of the general public use to understand difficult connections between science and ethics? What kinds of unique knowledge could social science theories and methods bring to such debates (different from what ethicists, philosophers, or theologians might tell us)? How have scientists entered into and responded to ethical debates that influence science and scientists? What have been scientists' contributions/difficulties in responding to ethics and science? In particular, we will also examine what shapes ethics? Should scientists/policy-makers pay attention to views on science ethics of members of the general public who are uninformed about particular scientific methodologies and problems? What is your response to the Skloot volume? How have scientists entered into and responded to ethical debates that influence science and scientists? What have been scientists' contributions/difficulties in responding to ethics and science? In particular, we will also examine what shapes ethics? Should scientists/policy-makers pay attention to views on science ethics of members of the general public who are uninformed about particular scientific methodologies and problems? How do such issues differ among nations? How does stem cell research provide a case study for examining how ethics and fraud impact scientific research, funding and the US research agenda.

Reading Due: (*69 pages*)
Goodstein, David. *On Fact and Fraud*, p. 59-68. (Chapter 4, "Codifying Misconduct: Evolving Approaches in the 1990s")

Kempner, Joanna, Clifford S. Perlis, and Jon F. Merz. 2005. "Forbidden Knowledge." *Science* Vol. 307, p. 854.

Kaiser, Jocelyn. 2004. "House Committee Slams NIH's Plan on Consulting." *Science* Vol. 304, no. 5674, p. 1091.

Skloot, Rebecca. *The Immortal Life of Henrietta Lacks,* p. 1-55. (Prologue, "The Woman in the Photograph"; Chapter 1, "The Exam"; Chapter 2, "Clover"; Chapter 3, "Diagnosis and Treatment"; Chapter 4, "The Birth of HeLa"; Chapter 5, "'Blackness Be Spreadin All Inside'"; Chapter 6, "'Lady's on the Phone'")

Taylor, Patrick. 2008. "Personal Genomes: When consent gets in the way." *Nature* 456:32-33.

Thought Papers: Cynthia Bau, Kate Baumann, Mark Chew, Kelly King, Elizabeth Liu, Rebecca Maher, McKenna Mitchell, Shreeya Patel, Jazz Silva, Emily Statham

Week 6, February 18: Religious Challenges to Science Part I
(Focus: Evolution and the Public School System; Science and Religion in the Academy) Evaluate Binder's arguments about Intelligent Design (where ID came from, where is it going). What does Binder think that "progressives" should do to manage ID? Critique Binder's approach. Evaluate Ecklund's approach to understanding the connections between religion and science through the lens of social science, incorporating concepts like the demarcation problem.

Reading Due: (*96 pages*)
Binder, Amy. 2007. "Gathering Intelligence on Intelligent Design: Where Did it Come From, Where Is it Going, and How Do (and Should) Progressives Manage It?" *Sociology of Education* 113:549-576.

Ecklund, Elaine Howard. *Science Vs. Religion* (1st half of book, p. 3-70).

Thought Papers: Cynthia Bau, Tim Chang, Andrew Elsey, Sarah Paschal Gerenday, Jacob Hernandez, Marie Hoeger, Kelly King, Jazz Silva, Emily Statham, Danni Vasquez-Corpus

Week 7, February 25: EXAM #1 – IN CLASS 1.5 HOUR EXAM

Mid-Term Evaluation of Course and hand back index cards to see if personal goals are being met.

March 4: NO SCHEDULED CLASS DUE TO SPRING BREAK

MODULE III: THE PUBLIC ENTERS SCIENCE

Week 8, March 11: Scientists Respond to Religion in the General Public
Provide an overview of how scientists see religion. How do their approaches to religion and spirituality differ from those in the general public (generally speaking)? What does Ecklund think that scientists should do to better transmit science to the general public?

Reading Due: (*85 pages*)
Ecklund, Elaine Howard. *Science Vs. Religion* (2nd half of book, p. 71-155).

Thought Papers: Brian Barr, Cynthia Bau, Andrew Elsey, Romil Patel, Shreeya Patel, Marica Sharashenidze, Helen Wei

Week 9, March 18: Money Impacts Science: The Changing Impact of Business on Science
Guest Lecturer David Johnson, Postdoctoral Fellow, Department of Sociology
In what ways have universities become market-oriented? How has this influenced the production of science? What ways might corporate interests influence the creation of science in general? What kinds of ways might corporate interests (like pharmaceutical companies) and research science intersect? What are ways the public might be duped through use of science. How do corporate marketers use science to dupe an unsuspecting public?

Reading Due: (*93 pages*)
Buchbinder, Howard. 1993. "The Market-Oriented University and the Changing Role of Knowledge." *Higher Education* 26:331-347.

Remington, John A. 1988. "Beyond Big Science in America: The Binding of Inquiry." *Social Studies of Science* 18(1):45-72.

Stuart, Toby E. and Waverly W. Ding. 2006. "When Do Scientists Become Entrepreneurs? The Social Structural Antecedents of Commercial Activity in the Academic Life Sciences." *American Journal of Sociology* 112(1):97-144.

Thought Papers: Brian Barr, Andrew Elsey, Jacob Hernandez, Rebecca Maher, McKenna Mitchell, Meron Teklu, Danni Vasquez-Corpus

Week 10, March 25: Political Challenges to the Support of Science
Guest Lecturer Kirstin Matthews, Fellow in Science and Technology Policy, Baker Institute
Today we will evaluate some of the key political challenges facing the advancement of science. What are some of the central ways that politics might influence the actual practice and transmission of science?

Reading Due: (*59 pages*)
Matthews, Kirstin. "Stem Cells: Saving Lives or Crossing Lines," Baker Institute Policy Study No. 31, September 2005. http://www.bakerinstitute.org/publications/study_31.pdf

Mooney, Chris. *Unscientific America*, p. 53-80. (Chapter 5, "Science Escape 2008"; Chapter 6, "Unpopular Science")

Thought Papers: Cynthia Bau, Tim Chang, Sarah Paschal Gerenday, Romil Patel, Marica Sharashenidze, Emily Statham

Week 11, April 1: Gender and Science
Guest Lecturer Di Di, Graduate Student, Department of Sociology
Does it matter whether men and women achieve equal representation in science careers? Why or why not? What are some of the key reasons that scholars think there are not more women in science? What are the unique aspects of science, the specific ways that science is socially constructed and, by inference, some of the unique ways that women might contribute to science? Why does the gender of the science workforce matter in the larger project of accepting public science? How do scientists themselves feel about the ways in which science careers have an impact on family life?

Reading Due: (*54 pages*)
Ecklund, Elaine Howard. *Beyond the Ideal Scientist,* p. 1-50.

McDonnell, Fiona. 2005. "Why So Few Choose Physics: An Alternative Explanation for the Leaky Pipeline." *American Journal of Physics* 73:583-586.

Thought Papers: Kelly King, Elizabeth Liu, Romil Patel, Shreeya Patel, Marica Sharashenidze, Jazz Silva, Emily Statham, Danni Vasquez-Corpus

Week 12, April 8: Ethics and Science Part II
We will discuss and differentiate between scientific uncertainty and fraud. We will determine the use of these terms in science as well as the media.

Reading Due: (*61 pages*)
Goodstein, David. *On Fact and Fraud*, p. 1-50, 135-145. (Chapter 1, "Setting the Stage"; Chapter 2, "In the Matter of Robert Andrews Millikan"; Appendix, "Caltech Policy on Research Misconduct")

Thought Papers: Morgan Abernathy, Brian Barr, Tim Chang, Andrew Elsey, Marie Hoeger, Romil Patel, Marica Sharashenidze, Meron Teklu, Helen Wei

Week 13, April 15: Race and Ethnicity and Science
Does it matter whether or not minorities achieve representation in science careers that is equal to their representation in the society at large? How might non-whites influence science and the generation of science? (Think broadly beyond racial classifications in the US to issues related to immigration and international scholars, the intersection of religion,

race, and immigration, for example).

AND

Where do we go from here? How can scientists better translate science to a broader public? How can the public better understand science? What can social science research/concepts methodologies contribute?

Reading Due: (*130 pages*)
Culotta, E. and A. Gibbons. 1992. "Minorities in science: Two generations of struggle." *Science* 258:1176.

Espinoza-Herold, M. and V. Gonzalez. 2007. "The voices of senior scholars on mentoring graduate students and junior scholars." *Hispanic Journal of Behavioral Sciences* 29:313-335.

Herzig, A. H. 2004. "Becoming mathematicians: Women and students of color choosing and leaving doctoral mathematics." *Review of Educational Research* 74(2):171-214.

Tapia, Richard. "Minority Students and Research Universities: How to Overcome the 'Mismatch,'" *The Chronicle of Higher Education*, March 27, 2009.

Thought Papers: Morgan Abernathy, Tim Chang, Sarah Paschal Gerenday, Elizabeth Liu, Rebecca Maher, Shreeya Patel, Jazz Silva, Meron Teklu

Week 14, April 22: EXAM #2 – IN CLASS 1.5 HOUR EXAM